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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/895,429	WANG ET AL.	
	Examiner	Art Unit	
	Kevin Siangchin	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-38 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-38 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 28 June 2001 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 5/2003 March 14.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

Detailed Action

Drawings

Objections

1. The drawings are objected to because of the following.

   a. In Figure 13, the function paths emanating from the conditional step 1306 are missing captions indicating, "YES" for an affirmative determination of text strokes and "NO" to indicate a negative determination. This is described in the last paragraph of page 46 of the Applicant's disclosure.

   b. In Figure 13, the functional path emanating from step 1310 is missing an arrow head.

   c. In Figure 16, the caption of step 1602 refers to a "16×16 CELL", whereas the corresponding description in the Applicant's disclosure (page 55, line 19) refers to a "16×16N cell". The drawing should be changed so that it is consistent with the disclosure.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

Objections

2. The disclosure is objected to because of the following informalities:

   a. On page 23, lines 21 of the Applicant's disclosure, the reference number 5043 should be replaced with 504_3.

   b. On page 29, lines 6-7 of the Applicant's disclosure, the reference number range 802_8-620_{12} should be replaced with 802_8-802_{12}. Similarly, on line 10of the same page, the

reference number range 802_9-602_{10} should be replaced with 802_9-802_{10}.

c. The Applicant's description of the stroke curvature measure, particularly the description relating to the tangent histogram (pages 24-25 of the Applicant's disclosure), seems to be contrary to the established definition of curvature.

First observe that the following: "the derivatives (e.g. slopes) of the tangents" (page 25, line 7 of the Applicant's disclosure) is clearly wrong. The derivative of the tangent is generally not the slope of tangent[1]. See also Fig. 6.

In a parameterized representation of a curve, the curvature is typically defined to be proportional to the second derivative (in the parameter) of the curve. It seems from the specification ("it can be understood that the second derivative of the tangent information…" – page 25, lines 11-15) that the second derivative of the tangent of the stroke serves as the measure of the stroke's curvature. Since the tangent of the stroke is the first derivative of the stroke, the curvature of the stroke according to the Applicant (i.e. the second derivative of the stroke) would be directly related to third-order derivative of the stroke. Such a definition of curvature does not fit the standard definition of curvature. Having said that, the applicant does mention the "derivative of the [tangent] angle curve" being used as the measure of curvature. As shown below, in the Cass et al. and Wilcox et al. references, the derivative of the tangent angle, specifically the *second* derivative, can be used as a measure of stroke curvature.

Lastly, it is not clear from the portions of the Applicant's specification cited above and Fig. 6, what exactly constitutes the tangent histogram. For example, there is no indication, in Fig. 6 or the specification, what values represent the tangent histograms. Is the reader to assume that the histogram is the second derivative information or the derivative of the tangent angle? The assumption, hereinafter, will be the latter, that is, the tangent histogram comprises information relating to the derivative of the tangent angle.

Appropriate correction is required.

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1 The slope of the tangent of a curve is the derivative of the curve. This, however, is not the value being sought according the Applicant's description.

Claims

Objections

3. Claim 21 is objected to because of the following informality. Claim 21 contains the following phrase, where the typographical error has been emphasized: "grouping some of the strokes based upon local characteristics of the strokes to *formed* grouped strokes". This should be changed to: "grouping some of the strokes based upon local characteristics of the strokes to *form* grouped strokes". Appropriate correction is required.

Rejections Under 35 U.S.C. § 102.

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Before proceeding, note that the Applicant's claims are directed to a computer readable medium having computer-executed instructions that implement some digital ink processing methodologies. It should be understood that these methodologies represent the inventive feature of the Applicant's claimed invention. Therefore, only these methodologies (or systems implementing these methodologies) will be treated in the subsequent rejections.

6. Claims 1 and 3-5 are rejected under 35 U.S.C. 102(e) as being anticipated by Wilcox et al. (U.S. Patent 6,565,611).

7. *The following is in regard to Claim 1.* Wilcox et al. disclose a method of indexing and classifying digital ink. The method includes the following steps:

(1.a.) Accessing a plurality of stroke samples (i.e. *digital ink* – Wilcox et al. column 3, lines 52-54), the stroke samples representing more than one class. See, for example, Wilcox et al. column 4, lines 19-21 and column 4, lines 63-67 to column 5, lines 1-9.

(1.b.) Extracting curvature features of each of the strokes for each class. See, for example, Wilcox et al. column 5, lines 37.

(1.c.) Using the curvature features (contained in *feature vectors* or *feature vector sequences* – Wilcox et al. column 5, lines 29-33), training a trainable classifier (e.g. dynamic programming (DP) hierarchical clustering algorithm embodied in Wilcox et al. Fig. 2, steps 210-230) to classify strokes for each class.

It has thus been shown that the digital ink indexing and classification method of Wilcox et al. sufficiently conforms to the method proposed by the Applicant in claim 1. Therefore, the teachings of Wilcox et al. anticipate the method of claim 1.

8. *The following is in regard to Claim 3.* As shown above, Wilcox et al. disclose a digital ink indexing and classification method that conforms to the method of claim 1. In determining the curvature features of the digital ink strokes, Wilcox et al. determine the second derivative of the tangent angle (Wilcox et al. column 5, lines 28-25). Naturally, this value is calculated at discrete intervals along the stroke curve (Wilcox et al. column 5, lines 28-29). In this way, the second derivative of the tangent angle is analogous to the tangent histogram of the Applicant's claimed invention. This should be clear from the Applicant's description of the tangent histogram found on pages 24-25 of the Applicant's disclosure. Taking this into account it should be clear that the digital ink indexing and classification method of Wilcox et al. sufficiently conforms to the method proposed by the Applicant in claim 3. Therefore, the teachings of Wilcox et al. anticipate the method of claim 3.

9. *The following is in regard to Claim 4.* As shown above, Wilcox et al. disclose a digital ink indexing and classification method that conforms to the method of claim 3. The second derivative of the

tangent angle ($\delta^2\theta_n$) indicates the curvature of the stroke. Naturally, this value is calculated at discrete intervals along the stroke curve (Wilcox et al. column 5, lines 28-29). In this manner, the curvature features of a stroke comprise the discreet curvature of the stroke. Therefore, the teachings of Wilcox et al. anticipate the method of claim 4.

10. *The following is in regard to Claim 5.* As shown above, Wilcox et al. disclose a digital ink indexing and classification method that conforms to the method of claim 3. The second derivative of the tangent angle ($\delta^2\theta_n$) indicates the curvature of the stroke. Naturally, this value is calculated at discrete intervals along the stroke curve (Wilcox et al. column 5, lines 28-29). In this manner, the curvature features of a stroke comprise the discreet curvature of the stroke. Therefore, the teachings of Wilcox et al. anticipate the method of claim 5.

11. Claims 6-7, 12-16, and 18-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Cass et al. (U.S. Patent 6,304,674).

12. *The following is in regard to Claim 6.* Cass et al. disclose a method of digital ink recognition. The method includes the following steps:

(6.a.) Accessing a digital ink file (e.g. the *gesture source* - Cass et al. column 3, lines 36-37) having at least one stroke therein.

(6.b.) Extracting curvature features of each of the strokes for each class. See, for example, Cass et al. column 4, lines 3-8 and Fig. 2.

(6.c.) Based upon the curvature features, determining whether the stroke is text (e.g. letters). See Cass et al. column 3, lines 45-50, in conjunction with column 4, lines 3-8.

It has thus been shown that the digital ink recognition method of Cass et al. sufficiently conforms to the method proposed by the Applicant in claim 6. Therefore, the teachings of Cass et al. anticipate the method of claim 6.

13. *The following is in regard to Claim 7.* As shown above, Cass et al. disclose a method of digital ink recognition that conforms to the method of claim 6. Furthermore, in the method of Cass et al. recognition

(i.e. determining whether the stroke is text, etc.) comprises evaluating the stroke with a trainable classifier known as a Hidden Markov Model (HMM). See, for example, Cass et al. column 4, lines 9-11. In this way, the digital ink recognition method of Cass et al. sufficiently conforms to the method proposed by the Applicant in claim 7. Therefore, the teachings of Cass et al. anticipate the method of claim 7.

14. *The following is in regard to Claim 12.* As shown above, Cass et al. disclose a method of digital ink recognition that conforms to the method of claim 6. The reader will note the similarity of the set of curvature features derived by Wilcox et al. with those (Cass et al. Fig. 2 and column 4, lines 3-8) of Cass et al. (they are identical). Therefore, taking into account the discussion above with regard to claim 4, for example, it should be clear that, in the method of digital ink recognition, the curvature features comprise the discreet curvature of the stroke. In this way, the digital ink recognition method of Cass et al. sufficiently conforms to the method proposed by the Applicant in claim 12. Therefore, the teachings of Cass et al. anticipate the method of claim 12.

15. *The following is in regard to Claim 13.* As shown above, Cass et al. disclose a method of digital ink recognition that conforms to the method of claim 12. In a manner identical to Wilcox et al., Cass et al. determine the second derivative ($\delta^2\theta_n$) of the tangent angle at discrete intervals along the stroke (Cass et al. Fig. 2 and column 4, lines 3-8). Again, $\delta^2\theta_n$ is analogous to the tangent histogram described on pages 24-25 of the Applicant's disclosure. In this way, the digital ink recognition method of Cass et al. sufficiently conforms to the method proposed by the Applicant in claim 13. Therefore, the teachings of Cass et al. anticipate the method of claim 13.

16. *The following is in regard to Claim 14.* As shown above, Cass et al. disclose a method of digital ink recognition that conforms to the method of claim 6. In a manner identical to Wilcox et al., Cass et al. determine the second derivative ($\delta^2\theta_n$) of the tangent angle at discrete intervals along the stroke. Again, $\delta^2\theta_n$ is analogous to the tangent histogram described on pages 24-25 of the Applicant's disclosure. In this way, the digital ink recognition method of Cass et al. sufficiently conforms to the method proposed by the Applicant in claim 14. Therefore, the teachings of Cass et al. anticipate the method of claim 14.

17. *The following is in regard to Claim 15.* Cass et al. disclose a system of digital ink recognition. The system includes the following steps:

(15.a.) A first data field comprising data representing information regarding a plurality of classes of digital ink strokes. For example, gesture classes, such as gesture class 800 depicted in Cass et al. Fig. 8, represent such data fields.

(15.b.) A second data field comprising trained information regarding curvature features of each of the digital ink strokes. The HMMs consist of various parameters (e.g. A, β_n, and π – Cass et al. column 4, lines 34-39) that are adjusted during a training process. See Cass et al. column 5, lines 2-9 and Figs. 4 and 6. Thus, the HMM(s) (as defined by the aforementioned parameters) associated with the given gestures can be taken to represent a second data field comprising trained information regarding curvature features of each of the digital ink strokes.

It has thus been shown that the digital ink recognition system of Cass et al. sufficiently conforms to the system proposed by the Applicant in claim 15. Therefore, the teachings of Cass et al. anticipate the system of claim 15.

18. *The following is in regard to Claim 16.* As shown above, Cass et al. disclose a system of digital ink recognition that conforms to the system of claim 15. As stated earlier, the HMM is a trainable classifier. Therefore, given the discussion above, the digital ink recognition system of Cass et al. sufficiently conforms to the system proposed by the Applicant in claim 16. As a result, the teachings of Cass et al. anticipate the system of claim 16.

19. *The following is in regard to Claim 18-20.* As shown above, Cass et al. disclose a system of digital ink recognition that conforms to the system of claim 15. Following from the arguments presented above, with regard to claims 12 and 13, it should be clear that the digital ink recognition system of Cass et al. the uses curvature features comprising the discreet curvature of the stroke (Cass et al. Fig. 2 and column 4, lines 3-8) and a second histogram of the tangent angle ($\delta^2\theta_n$), which, as mentioned several times above, is analogous to the tangent histogram of the Applicant's description. Therefore, given the discussion above,

the digital ink recognition system of Cass et al. sufficiently conforms to the systems proposed by the Applicant in claims 18-20. As a result, the teachings of Cass et al. anticipate the systems of claim 18-20.

20. Claims 21-24, 26, and 28-38 are rejected under 35 U.S.C. 102(b) as being anticipated by Altman et al. (U.S. Patent 5,517,578).

21. *The following is in regard to Claim 21.* Cass et al. disclose a method of grouping and manipulating digital ink. The method includes the following steps:

(21.a.) Accessing a digital ink file having a plurality of strokes therein. See, for example, Altman et al. column 3, lines 60-61 and column 5, lines 10-20.

(21.b.) Grouping some of the strokes based upon local characteristics of the strokes to formed grouped strokes. See Altman et al. Figs. 3 and, particularly, 4A-4B. Local characteristics used in the grouping include spatial characteristics of the strokes. See steps 75 and 79 of Altman et al. Fig. 4B.

It has thus been shown that Altman et al.'s method of grouping and manipulating digital ink sufficiently conforms to the method proposed by the Applicant in claim 21. Therefore, the teachings of Altman et al. anticipate the method of claim 21.

22. *The following is in regard to Claim 22.* As shown above, Altman et al. disclose a method of grouping and manipulating digital ink that conforms to the method of claim 21. As discussed above relative to step (21.b), local characteristics upon which the stroke grouping is based can include spatial characteristics of the strokes. Therefore, Altman et al.'s method of grouping and manipulating digital ink sufficiently conforms to the method proposed by the Applicant in claim 22.

23. *The following is in regard to Claim 23.* As shown above, Altman et al. disclose a method of grouping and manipulating digital ink that conforms to the method of claim 22. In the method of Altman et al., the distance between strokes is compared against a threshold distance (e.g. 40/64 of a line height) when forming the *chained groups* (Altman et al. column 6, lines 53-57). See Altman et al. column 7, lines 6-10. This sufficiently addresses the limitations of claim 23. Note that a similar case can be made for the

grouping discussed in Altman et al. column 11, lines 29-41. Therefore, the teachings of Altman et al. anticipate the method of claim 23.

24. *The following is in regard to Claim 24.* As shown above, Altman et al. disclose a method of grouping and manipulating digital ink that conforms to the method of claim 22. In the method of Altman et al., the grouping of the strokes is also based on the relative heights of the strokes. See, for example, Altman et al. column 6, lines 2-15. Therefore, Altman et al.'s method of grouping and manipulating digital ink sufficiently conforms to the method proposed by the Applicant in claim 24. In this way, the teachings of Altman et al. anticipate the method of claim 24.

25. *The following is in regard to Claim 26.* As shown above, Altman et al. disclose a method of grouping and manipulating digital ink that conforms to the method of claim 21. In the method of Altman et al., the grouping of the strokes is also based on the relative heights of the strokes. See, for example, Altman et al. column 6, lines 2-15. Therefore, Altman et al.'s method of grouping and manipulating digital ink sufficiently conforms to the method proposed by the Applicant in claim 26. In this way, the teachings of Altman et al. anticipate the method of claim 26.

26. *The following is in regard to Claim 29.* As shown above, Altman et al. disclose a method of grouping and manipulating digital ink that conforms to the method of claim 21. Altman et al. further group strokes according to the characteristics of other strokes. For example, Altman et al. assume that if a stroke of a particular class (e.g. drawing or text) has already been drawn in a region, the strokes in that region are likely to be of the same class (Altman et al. column 5, lines 41-61). In this way, Altman et al.'s method of grouping and manipulating digital ink sufficiently conforms to the method proposed by the Applicant in claim 29. Therefore, the teachings of Altman et al. anticipate the method of claim 29.

27. *The following is in regard to Claim 30.* As shown above, Altman et al. disclose a method of grouping and manipulating digital ink that conforms to the method of claim 29. Other characteristics that determine the grouping of strokes, in Altman et al.'s method, include the height of a stroke. The method determines whether this height is within some normalized height (e.g. two line heights). Such strokes are considered writing strokes (Altman et al. column 5, lines 59-67 to column 6, lines 16). That is, the grouping of strokes is based upon a normalized height of at least some of the plurality of strokes. In addition, this grouping also involves weighting strokes "by multiplying the top coordinate of each stroke by 2, adding the

bottom coordinate and then dividing the total by three [(2×top+bottom)/3]. All the strokes in the chained group are then associated with the line in which their average weighted vertical center lies" (Altman, et al. column 7, lines 17-30). That is, the height of the strokes is normalized during the chain grouping of Altman et al.'s method. In this either case, Altman et al.'s method of grouping and manipulating digital ink sufficiently conforms to the method proposed by the Applicant in claim 30. Therefore, the teachings of Altman et al. anticipate the method of claim 30.

28. *The following is in regard to Claim 31.* As shown above, Altman et al. disclose a method of grouping and manipulating digital ink that conforms to the method of claim 29. The method of Altman et al. further includes:

(31.a.) Classifying some of the plurality of strokes as text strokes. See Altman et al. column 5, lines 41-61. Notice that method of Altman et al. makes the distinction between drawing strokes and writing (text) strokes. See Altman et al. Fig. 2A, step 44 and Fig. 2B, step 54.

(31.b.) Grouping some of the strokes based upon characteristics of the plurality of strokes comprises grouping some of the strokes based upon a normalized height of the text strokes. This was addressed above with respect to claim 30.

Altman et al.'s method of grouping and manipulating digital ink thus conforms sufficiently to the method proposed by the Applicant in claim 31. In this way, the teachings of Altman et al. anticipate the method of claim 31.

29. *The following is in regard to Claim 32.* As shown above, Altman et al. disclose a method of grouping and manipulating digital ink that conforms to the method of claim 29. Grouping according to the characteristics of other strokes is also done according to a *center point overlap method* (Altman et al. column 8, lines 23-25), which groups a current stroke with other strokes when the center point of the current stroke is within a threshold distance of the center points of other strokes (Altman et al. column 8, lines 39-44). In this way, Altman et al.'s method of grouping and manipulating digital ink sufficiently conforms to the method 32. Therefore, the teachings of Altman et al. anticipate the method of claim 32.

30. *The following is in regard to Claim 33.* As shown above, Altman et al. disclose a method of grouping and manipulating digital ink that conforms to the method of claim 21. The method of Altman et al. further comprises:

(33.a.) Classifying some of the plurality of strokes as text strokes. See Altman et al. column 5, lines 41-61. Notice that method of Altman et al. makes the distinction between drawing strokes and writing (text) strokes. See Altman et al. Fig. 2A, step 44 and Fig. 2B, step 54.

(33.b.) Designating at least one of the stroke groups as a text stroke group based upon at least some of strokes in the stroke group being text. This was addressed previously with respect to claim 29. For example, strokes in a region already determined to contain writing (text) strokes are assumed to be text strokes (Altman et al. column 5, lines 41-61).

Therefore, Altman et al.'s method of grouping and manipulating digital ink sufficiently conforms to the method 33. The teachings of Altman et al. thus anticipate the method of claim 33.

31. *The following is in regard to Claim 34.* As shown above with respect to claim 21 and 29, Altman et al. disclose a method of grouping and manipulating digital ink, comprising the access of a digital ink file having a plurality of strokes therein and grouping some of the strokes based upon characteristics of the plurality of strokes. Therefore, with regard to claim 34, arguments made above, with respect to claims 21 and 29 are applicable. Taking into account the discussions above relating to these claims, it can be concluded that the teachings of Altman et al. anticipate the method of claim 34.

32. *The following is in regard to Claim 35-38.* These claims recite substantially the same limitations as claims 30-33, respectively. Therefore, with regard to claims 35-38, remarks analogous to those presented above with regard to claims 30-33 are respectively applicable. Taking into account the discussion above relating to these claims, it can be concluded that the teachings of Altman et al. anticipate the methods of claim 35-38.

Rejections Under 35 U.S.C. § 103(a)

33. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject

matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

34. Before proceeding, note that the Applicant's claims are directed to a computer readable medium having computer-executed instructions that implement some digital ink processing methodologies. It should be understood that it is these methodologies represent the inventive feature of the Applicant's claimed invention. Therefore, only these methodologies will be treated in the subsequent rejections.

35. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wilcox et al., in view of Burges ("A Tutorial on Support Vector Machines for Pattern Recognition", 1998).

36. *The following is in regard to Claim 2.* As shown above, Wilcox et al. disclose a digital ink indexing and classification method that conforms to the method of claim 1. Wilcox et al., however, fail to show or suggest using a Support Vector Machine (SVM) as the trainable classifier.

37. Burgess discusses, at great length, support vector machines and their applicability to pattern recognition. Burgess points out the applicability of SVMs to handwriting recognition and classification (Burges, page 121, last paragraph).

38. The teachings of Burges and Wilcox et al. are combinable because they are analogous art. Specifically, Burges' teachings are directed toward the application of SVMs to pattern recognition, with handwriting recognition being one mentioned instance of such an application. Wilcox et al. discuss the application of a trainable classification scheme (which belongs to the field of pattern recognition) to handwritten digital ink. Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the applicant's claimed invention, to use an SVM, such as that which is described by Burges, in lieu of a DP hierarchical clustering algorithm, for the classification of strokes in the method of indexing and classifying digital ink proposed by Wilcox et al. One of the primary advantages of using SVMs over other methods is that SVM learning is independent of the dimensionality of the feature space. This, in turn, allows classification or recognition algorithm, employing SVMs, to accommodate very high dimensional feature vectors, without succumbing to substantial performance degradation (Burges, page 147, section 5.1,

paragraph 1). Using an SVM, as just discussed, in the method of Wilcox et al. would produce a method that adequately satisfies the limitations of claim 2.

39. Claims 8-11 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cass et al., in view of Burges.

40. *The following is in regard to Claim 8.* As shown above, Cass et al. disclose a method of digital ink recognition that conforms to the method of claim 6. Cass et al., however, fail to show or suggest using a Support Vector Machine (SVM) as the trainable classifier.

41. Burgess discusses, at great length, support vector machines and their applicability to pattern recognition. Burgess points out the applicability of SVMs to handwriting recognition and classification (Burges, page 121, last paragraph).

42. The teachings of Burges and Cass et al. are combinable because they are analogous art. Specifically, Burges' teachings are directed toward the application of SVMs to pattern recognition, with handwriting recognition being one mentioned instance of an application. Cass et al. discuss the application of a trainable classification scheme (namely, HMMs) to handwritten digital ink. Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the applicant's claimed invention, to use an SVM, such as that which is described by Burges, in lieu of or in addition to HMMs, for the classification of strokes in the method of digital ink recognition proposed by Cass et al. One of the primary advantages of using SVMs over other methods is that SVM learning is independent of the dimensionality of the feature space. This, in turn, allows classification or recognition algorithms, employing SVMs, to accommodate very high dimensional feature vectors, without succumbing to substantial performance degradation (Burges, page 147, section 5.1, paragraph 1). On the other hand, combining an SVM with an HMM, such as that of Cass et al., would preserve the support for high dimensionality provided by an SVM, while accounting for the temporal structure of the digital ink strokes using an HMM. Using an SVM, as just discussed, in the method of Cass et al. would produce a method that adequately satisfies the limitations of claim 8.

43. *The following is in regard to Claim 9-11.* As shown above, Cass et al. disclose a method of digital ink recognition that conforms to the method of claim 8. The bases for the rejections of claims 9-11 follow, respectively, from the discussions above with regard to claims 12-14, in conjunction with the discussion above relating to claim 8.

44. *The following is in regard to Claim 17.* As shown above, Cass et al. disclose a system of digital ink recognition that conforms to the system of claim 15. It should be clear from that discussion and the preceding discussion with regard to claim 8, that the teachings of Cass et al. and Burges can be combined to address the limitations of claim 17. For reasons that are analogous to those presented above with respect to claim 8, such a combination would have been obvious to one of ordinary skill in the art, at the time of the Applicant's claimed invention.

45. Claims 25, and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Altman et al., in view of Altman et al. (U.S. Patent Application Publication 2002/0064308A1). In order to distinguish these references by name, these references will be referred to, henceforth, as Altman 1996 and Altman 2002, respectively.

46. *The following is in regard to Claim 25.* As shown above, Altman 1996 discusses a method of grouping and manipulating digital ink that conforms to the method of claim 24. Altman 1996, however, does not show grouping according to the local characteristics of the grouped strokes comprising grouping some of the strokes based upon a relative aspect ratio of the strokes.

47. Altman 2002 essentially proposes an extension of the method proposed in Altman 1996. In the method of Altman 2002, the grouping of certain strokes is based on local characteristics that include the relative aspect ratio of the strokes. See, Altman 2002 column 18, lines 14-24 of paragraph [0130].

48. The teachings Altman 1996 and Altman 2002 are clearly combinable, as they teach essentially the same underlying system and method of grouping and manipulating digital ink. Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the applicant's claimed invention, to use the relative aspect ratio to group certain strokes. According to Altman 2002 (Altman 2002, column 18, sentence 1 of paragraph [0129]), the motivation to do so would have been to account for certain strokes,

such as those corresponding to dashes and/or bullets, during the grouping of strokes. Incorporating this aspect of Altman 2002's method into the method of Altman 1996, would yield a method that conforms to that which is put forth by the Applicant in claim 25.

49. *The following is in regard to Claims 27-28.* Taking into account the previous discussion relating to claim 25 and the discussions above relating to claims 26 and 21, respectively, it should be clear that combining the teachings of Altman 2002 and Altman 1996, in the manner just described, results in a method that conforms substantially to that of claims 27 and 28.

Citation of Relevant Prior Art

50. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

[1] *U.S. Patent 5,889,523.* Wilcox et al. Publication Date: May 1999.

Wilcox et al. disclose a method for dynamically grouping a plurality of graphic objects, such as digital ink, in a manner analogous to selection in a typed-text system. The method also provides an accurate selection technique for graphical editing that is applicable to accurately edit graphic objects, such as drawings or other non-text notes. Also discussed by Wilcox et al. is the normalization of graphic object size, as a means to facilitate the grouping process (e.g. Wilcox et al. column 8, lines 58-65 and column 10, lines 19-24).

[2] *Ink as Multimedia Data.* Proceedings of the Fourth International Conference on Information, Systems, Analysis and Synthesis, Daniel Lopresti. July 1998.

[3] *Algorithms for Matching Hand-Drawn Sketches.* Fifth International Workshop on Frontiers in Handwriting Recognition, Lopresti, et al. September 1996.

[4] *On Handling Electronic Ink.* ACM Computing Surveys. Aref, et al. December 1995.

[5] *On the Searchability of Electronic Ink.* Fourth International Workshop on Frontiers in Handwriting Recognition, Lopresti, et al. December 1994.

References [2]-[5], generally, discuss the parsing of digital ink strokes for instances of text strokes and/or strokes corresponding to hand-written drawings. [5] additionally discussed the quanitization of feature

vectors corresponding to digital ink strokes. This may have some relevance to the discussion of vector quantization in Applicant's disclosure. Additional relevant prior art encountered includes:

[6] *U.S. Patent 5,687,254.* Poon et al. Publication Date: November 1997.

Poon et al. disclose a method for searching and recognizing unrecognized digital ink handwriting. Poon et al. discuss extensively the "concatenation" of ink strokes or gestures.

[7] *Scribbler: A Tool for Searching Digital Ink.* ACM SIGCHI '95 Proceedings, Short Papers. [Retrieved from *http://www.acm.org/sigchi/chi95/Electronic/documnts/shortppr/adp_bdy.htm* on July 16, 2004], Poon et al., 1995.

Scribbler is a tool that enables users to search untranslated digital ink for target patterns such as words, symbols and simple sketches.

[3] *Text Categorization with Support Vector Machines: Learning with Many Relevant Features..* Proceedings of the European Conference on Machine Learning, Joachims, T. 1998.

Jaochims discusses the application of SVM to text categorization.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Siangchin whose telephone number is (703)305-7569. The examiner can normally be reached on 9:00am - 5:30pm, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703)308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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